

MERIE PLASMA REACTOR WITH OVERHEAD RF ELECTRODE  
TUNED TO THE PLASMA WITH ARC SUPPRESSION

ABSTRACT OF THE DISCLOSURE

5 A plasma reactor for processing a semiconductor workpiece,  
includes a reactor chamber having a chamber wall and containing  
a workpiece support for holding the semiconductor support, the  
electrode comprising a portion of the chamber wall, an RF power  
generator for supplying power at a frequency of the generator to  
10 the overhead electrode and capable of maintaining a plasma  
within the chamber at a desired plasma ion density level. The  
overhead electrode has a capacitance such that the overhead  
electrode and the plasma formed in the chamber at the desired  
plasma ion density resonate together at an electrode-plasma  
15 resonant frequency, the frequency of the generator being at  
least near the electrode-plasma resonant frequency. The reactor  
further includes a set of MERIE magnets surrounding the plasma  
process area overlying the wafer surface that produce a slowly  
circulating magnetic field which stirs the plasma to improve  
20 plasma ion density distribution uniformity.